REMARKS

By the present Amendment, Table 4 has been amended to correct the indication that Polyol D is within the definition of Polyol (C) consistent with the characterization shown in Tables 1-3. The claims, however, have not been amended as applicants respectively maintain that the claims are patentable over the cited prior art of record.

Based on the reasons set forth in the Official Action, applicants believe that the Examiner may not fully appreciate the significance of each of the recited features of the claims and therefore provide the following discussion. As recited in claim 1, one aspect of the present invention relates to a flexible polyurethane foam obtained by contacting a polyol composition (A) comprising 0.5 to 3 parts by weight of a polyetherpolylol (polyol (D)) having a defined amine value and a defined hydroxyl value that is produced by the addition of an alkylene oxide to at least one amine compound represented by defined formula (II) with an organic polyisocyanate. The polyol composition additionally comprises 0 to 99.5 parts by weight of defined polyol (B) and 0 to 99.5 parts by weight of defined polyol (C) with the polyols being in such a ratio that the sum is 100 parts by weight. Claim 4 recites the polyol composition, *per se*, using the same definitions and amounts.

The first point to recognize is that the defined polyol composition is designed to obtain a flexible polyurethane foam as explicitly recited in claim 1. A flexible polyurethane foam has a significance in the art and is understood to be different from rigid foams. It is for this reason that the flexible polyurethane foam of claim 1 is especially suitable as an automobile seat pad or sound insulating material as recited in certain claims of record. The understanding in the art that flexible polyurethane

foams are distinct from rigid foams is substantiated by reference to the attached Tables of Contents of "Polyurethane Handbook" (see sections 5 and 6) and "Handbook of Polymeric Foams and Foam Technology" (see sections 4 and 5).[1]

The next point to consider is that the claims expressly recite that the polyol (D) be present in an amount of 0.5 to 3 parts by weight and is a polyetherpolylol having a defined amine value and a defined hydroxyl value that is produced by the addition of an alkylene oxide to at least one amine compound represented by defined formula (II). Defined polyol (B) and/or polyol (C) must also be present so that the total amount of polyol is 100 parts by weight.

When following the teachings of the present invention, a flexible polyurethane foam can be obtained that can exhibit reduced volatile amine emission and which has excellent characteristics as shown in the Examples in the Tables starting on page 33. For instance, Examples 2 and 3 in Table 1 illustrate that when the polyol is produced by the addition of ethylene oxide to methyliminobispropylamine (within formula (2) of the independent claims), superior curability is obtained relative to Comparative Examples 2 and 3 that use polyols produced by adding ethylene oxide to ethylene diamine, a common aliphatic amine compound that does not meet formula (2). It will also be noted that Comparative Example 4 uses Polyol J which is also prepared from methyliminobispropylamine, but which has an amine value and hydroxyl number outside of those claimed (see the discussion at the bottom of page 29) and provides inferior results.

With respect to Table 2, a comparison of Examples 5 and 6 shows that when the polyol is produced by adding ethylene oxide to methyliminobispropylamine

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[1] Due to the length of the chapters, they have not been attached. However, at the request of the Examiner applicants will provide them.

(Example 5), superior results with respect to closed cell properties, elongation and wet heat compression set can be obtained relative to when the polyol is produced by adding ethylene oxide to 1-(2-aminoethyl)piperazine. Comparative Example 7 in Table 2 illustrates the adverse consequences of too much polyol (D) in the composition (i.e., 3.2%) while other Comparative Examples show the effect of too little polyol (D).

The WO '976 publication does not in any way disclose or teach the defined foam or composition which includes 0.5 to 3 parts by weight of the polyol (D) having the defined amine value and the defined hydroxyl value that is produced by the addition of an alkylene oxide to at least one amine compound represented by defined formula (II). It is noted that the WO '976 publication expressly distinguishes between flexible and rigid foams and in the paragraph bridging pages 8 and 9 states that in the production of "flexible polyurethane foam", the average hydroxyl number should be in the range of 20 to 100 mg KOH/g, preferably from 20 to 70 mg KOH/g. Therefore, it is clear that the WO '976 publication would actually teach away from this aspect of applicants' invention.

With regard to the recited amount of polyol (D) being 0.5 to 3 parts by weight, applicants again note that the evidence of record demonstrates the relevance of this recitation. In contrast, the WO '976 publication discloses that (b2) (the material alleged to meet polyol (D) in the Action) is present in an amount of 5 to 100 parts by weight. The illustrative materials of (b2) are Polyol B at page 22, line 30 having a 1,000 EW which corresponds to a hydroxyl value of 56 mg KOH/g and Polyol F on page 23, line 20 having a 1,700 EW that corresponds to a hydroxyl value of about 33 mg KOH/g. Furthermore, Polyol B is used in an amount of 100% in Table 1, 40 and

50% in Table II, 20, 40.4 and 20.2% in Table IV and 50% in Table VI while Polyol F is used in an amount of 95.5 and 46.75% in Table VII. Therefore, this information, which cannot be ignored, also would lead those of ordinary skill in the art away from the present invention.

Accordingly, without improperly resorting to applicants' own specification, the WO '976 publication would not lead those of ordinary skill in the art to applicants' claimed invention or to an appreciation of the substantial advantages which can be obtained therefrom. Indeed, by following the teachings of the WO '976 publication, one would be led away from invention as defined in the claims.

The further reliance on Falke et al., U.S. Patent No. 6,087,410, to show the wet heat compression set ratio and density recited in dependent claims 6 and 7 does not remedy the substantial shortcomings of the WO '976 publication. Thus, even assuming for the sake of argument that a proper basis exists for combining the documents in the manner advanced by the Examiner, the claims of record are still patentable over the combination of patent documents.

For all of the reasons set forth above, applicants respectfully submit that the claims of record are patentable over the cited prior art, especially in view of the technical evidence that has been provided, and therefore request reconsideration and allowance of the present application.

Should the Examiner have any questions concerning the subject application, the Examiner is invited to contact the undersigned attorney at the number provided below.

The Director is hereby authorized to charge any appropriate fees under 37 C.F.R. §§ 1.16, 1.17 and 1.20(d) and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 02-4800.

Respectfully submitted,

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Date: September 3, 2010

Polyurethane Handbook

Chemistry – Raw Materials – Processing – Application – Properties

Edited by Dr. Günter Oertel

With 544 Figures and 121 Tables

With contributions from

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Hanser Publishers, Munich Vienna New York

Distributed in the United States of America by
Macmillan Publishing Co., Inc., New York
and in Canada by
Collier Macmillan Canada, Ltd., Toronto

Numerical flamespread ratings mentioned in this book are not intended to reflect hazards presented by those or any other materials under actual fire conditions.

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Published by
Carl Hanser Verlag
Kolbergerstr. 22
D-8000 München 80

Distributed in USA by
Scientific and Technical Books
Macmillan Publishing Co., Inc.
866 Third Avenue, New York, N. Y. 10022

Distributed in Canada and Latin America by
Collier Macmillan International
866 Third Avenue, New York, N. Y. 10022-6299

Distributed in the United Kingdom by
Adam Hilger Ltd.
Techno House, Redcliffe Way
Bristol BS 1, 6MX Great Britain

Distributed in all other countries via
Carl Hanser Verlag
Kolbergerstraße 22
D-8000 München 80

CIP-Kurztitelaufnahme der Deutschen Bibliothek

Polyurethane Handbook: Chemistry – Raw Materials – Processing – Applications / ed. by Günter Oertel. With contributions from L. Abele ... – Munich ; Vienna ; New York : Hanser, 1985.
Einheitssacht. : Polyurethane <engl.>
Teilausg. von: Kunststoff-Handbuch
ISBN 3-446-13671-1

NE: Oertel, Günter [Hrsg.] ; Abele, Lothar [Mitverf.] ; EST

ISBN 0-02-948920-2 Macmillan Publishing Co., Inc., New York
Library of Congress Catalog Card Number 85-060442

Printed in Germany (FRG) by Spandel-Druck GmbH, Nürnberg

Preface

The "Polyurethanes" volume of the Kunststoff-Handbuch series was selected for translation into English in light of the tremendous pace of technological development and commercial progress since the basic invention of polyurethane chemistry by Prof. *Otto Bayer* nearly 50 years ago.

Today, numerous building blocks and polymer structures are available to chemists and engineers for the synthesis of polyurethanes by the polyaddition principle. During fifty years of polyurethane chemistry, several polyisocyanates have become available on a technical scale. Most prominent and important among them are the two high volume product groups: toluene diisocyanate (TDI) and diphenyl methane diisocyanate (MDI). Using isocyanates and a multitude of polyester- and polyether-polyols, the polyurethane chemist was able to tailormake thermoset and thermoplastic materials. Understanding the dependance of physical properties on polymer morphology is an invaluable tool in this process. Progress in polymer physics and in polymer analysis has made special contributions towards that understanding.

Because the manufacturer of polyurethane articles converts low-molecular weight raw materials into finished polymers at the production site, we have placed special emphasis on the chemistry of polyurethane raw materials, on process description, and on processing equipment.

We sincerely thank the authors of this volume for their efforts. Special thanks go to Mrs. *Petra Böckly*, as well as to Drs. *Brochhagen*, *Hahn*, *Rothermel*, *Schauerte* and *Uhlig*, who integrated the various chapters and formulated the final version of the book.

This volume was not translated by professional translators, but by experts in polyurethane technology at the Mobay Chemical Corporation under the supervision of Dr. *J. Ick*. We thank the translating team for their effort, and hope that the technical quality of the English edition compensates for any possible stylistic flaws.

Leverkusen, April 1985 *Günter Oertel*

Contents

Handbook of Polymeric Foams and Foam Technology

2nd Edition

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Daniel Klempner and Vahid Sendijarevic

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HANSER
Hanser Publishers, Munich
Hanser Gardener Publications, Inc., Cincinnati

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Distributed in the USA and in Canada by
Hanser Gardner Publications, Inc.
6915 Valley Avenue, Cincinnati, Ohio 45244-3029, USA
Fax: (513) 527-8801
Phone: (513) 527-8977 or 1-800-950-8977
Internet: http://www.hansergardner.com

Distributed in all other countries by
Carl Hanser Verlag
Postfach 86 04 20, 81631 München, Germany
Fax: +49 (89) 98 12 64
Internet: http://www.hanser.de

Library of Congress Cataloging-in-Publication Data

Handbook of polymeric foams and foam technology / edited by Daniel
Klempner and Vahid Sendijarevic ; with contributions by R. M. Aseeva ...
[et al.].– 2nd ed.
p. cm.
ISBN 1-56990-336-0 (hardcover)
1. Plastic foams. I. Klempner, Daniel. II. Sendijarevic, Vahid. III.
Aseeva, R. M. (Roza Mikhaailovna)
TP1183.F6H36 2004
668.4'93–dc22
2003025345

Bibliografische Information Der Deutschen Bibliothek
Die Deutsche Bibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie; detaillierte bibliographische Daten sind im Internet über <http://dnb.ddb.de> abrufbar.
ISBN 3-446-21831-9

Production Management: Oswald Immel
Coverconcept: Marc Müller-Bremer, Rebranding, München, Germany
Coverdesign: MCP • Susanne Kraus GbR, Holzkirchen, Germany
Typeset, printed and bound by Kösel, Kempten, Germany

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meric foams of all types. In addition, individuals engaged in marketing of foams or foam raw materials will find this book of practical value. It can also be used as a textbook for a course on polymeric foams.

The editors hope that this book will stimulate creative thinking and development of new technologies, types of foams, processes, and applications.

Daniel Klempner
Vahid Sendijarevic

Acknowledgements

The editors wish to express their appreciation to the University of Detroit Mercy and to the staff of Troy Polymers, Inc. for their encouragement and helpful advice in this undertaking.

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